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INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

REC'D 10 AUG 2004

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Applicant's or agent's file reference 1674BMG	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IT 03/00215	International filing date (<i>day/month/year</i>) 08.04.2003	Priority date (<i>day/month/year</i>) 08.04.2002
International Patent Classification (IPC) or both national classification and IPC B41J13/00		
Applicant OLIVETTI TECNOST S.P.A. ET AL.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 05.11.2003	Date of completion of this report 06.08.2004
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 </div> </div>	Authorized Officer Wehr, W Telephone No. +31 70 340-3548



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I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-14 as originally filed

Claims, Numbers

1-25 received on 05.07.2004 with letter of 02.07.2004

Drawings, Sheets

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
☐ paid additional fees.
☐ paid additional fees under protest.
☒ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
☒ the parts relating to claims Nos. 1-22 .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-22
	No: Claims	
Inventive step (IS)	Yes: Claims	1-22
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

2. Citations and explanations

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see separate sheet

Re Item IV

The International Preliminary Examination Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-22

Paper feeding device comprising a changeover mechanism to move a sheet to be printed in a preparation stage, wherein the preparation stage includes in sequence sub-stages of feeding and retracting

2. Claims: 23-25

Paper feeding device comprising a worm screw and a helical wheel for moving a sheet at high resolution in association with printing

The prior-art document US 4 789 259 A discloses a paper feeding device for dot printers comprising a paper feeding motor, and a changeover mechanism arranged downstream of said motor and suitable for actuation in response to predetermined operating conditions of the printer to move a sheet to be printed at high speed in a preparation stage and at high resolution in association with printing, said paper feeding device being provided for movement of the sheet in a given direction of printing.

The subject-matter of the first invention differs from the mentioned prior-art document in the following special technical features (see claim 1):

- the preparation stage includes in sequence sub-stages of feeding and retracting,
- wherein the feeding sub-stage is associated with picking of the sheet from a pack with movement of the sheet in a direction consistent with the direction of printing and
- the retracting sub-stage includes the movement of the sheet in the direction opposite the direction of printing, along an alternative path to the picking path.

From the above, the following problem of the first invention can be formulated so as to provide a paper feeding device for a dot photographic printer that works with two speeds of sheet movement and that allows fast and precise positioning of the sheets before a printing operation.

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The subject-matter of the second invention differs from the prior-art document in the following special technical features (see claim 23):

- a kinematic linkage comprising a worm screw that may be actuated by the paper feeding motor and a helical wheel for moving a sheet at high resolution in association with printing.

The problem to be solved by the second group of claims could thus be said to be the provision of an improved paper feeding device.

Thus the two stated groups of claims solve different problems with respect to the afore-mentioned prior art by means of different special technical features.

Therefore the stated groups of claims are not linked by a single general inventive concept as required by Rule 13.1 PCT and there is no technical relationship between the stated groups of claims involving the same or corresponding special technical features as required by Rule 13.2 PCT.

The two stated groups of claims therefore lack unity of invention according to Rules 13.1 and 13.2 PCT.

Re Item V

Reference is made to the following documents:

D1: US-A-4 789 259 (KATAYANAGI JUN) 6 December 1988 (1988-12-06)

D2: PATENT ABSTRACTS OF JAPAN vol. 007, no. 244 (M-252), 28 October 1983 (1983-10-28) & JP 58 131084 A (TOKYO SHIBAURA DENKI KK), 4 August 1983 (1983-08-04)

The document D1, which is considered to represent the most relevant state of the art, discloses (cf. fig. 2 and column 3) a paper feeding device for dot printers comprising a changeover mechanism to move a sheet to be printed at high speed in a preparation stage

from which the subject-matter of claim 1 differs in that

- the preparation stage includes in sequence sub-stages of feeding and retracting,
- wherein the feeding sub-stage is associated with picking of the sheet from a pack with movement of the sheet in a direction consistent with the direction of printing and
- the retracting sub-stage includes the movement of the sheet in the direction opposite the direction of printing, along an alternative path to the picking path.

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The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a paper feeding device for a dot photographic printer that works with two speeds of sheet movement and that allows fast and precise positioning of the sheets before a printing operation.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: The documents D1 and D2 do not disclose and give no hint for any conveyance of a sheet to be printed in a reverse direction in a "preparation stage" of the sheet feeding operation; such a positioning operation (before printing) is not foreseen in the known printers.

Claims 2, 3, 10 to 14, 16, 17 and 18 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

*

The document D1, which is considered to represent the most relevant state of the art, discloses a paper feeding device for dot printers from which the subject-matter of claim 4 differs in that

- the paper feeding device comprises an actuating member positioning of which is servo dependent on the direction of rotation of the paper feeding motor for switching the changeover mechanism between high speed and high resolution.

The subject-matter of claim 4 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention according to claim 4 may be regarded as providing a paper feeding device for a dot photographic printer that is reliable, fast and inexpensive.

The solution to this problem is considered as involving an inventive step (Article 33(3)PCT) for the following reasons:

The document D1 discloses a paper feeding motor that can be actuated in both rotating directions; when this motor is rotated in the forward direction, a paper feed roller (element 10) and a paper discharge roller (element 11) are rotated at the same time, and when this motor is rotated in the reverse direction, only the discharge roller is rotated and (because of a one-way clutch: element 13) not the paper feed roller.

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This document does not give any hint for an actuating member which positioning is servo dependent on the direction rotation of the paper feeding motor for switching the changeover mechanism.

Claims 5 to 9 and 15 are dependent on claim 4 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

*

The paper feeding device according to claim 19 differs from that disclosed in the document D1 in that it comprises, in particular:

- a first kinematic linkage associated with the feeding motor for producing high speed sheet movements in a picking and print preparation stage, a second kinematic linkage associated with said feeding motor and having a transmission ratio different from that of said first kinematic linkage for producing high resolution sheet movements in association with printing.

The problem to be solved by the invention according to claim 19 may be regarded as providing a paper feeding device for a dot photographic printer that is reliable, fast and inexpensive.

The solution to this problem proposed in claim 19 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: The document D1 does not show any movement of the sheet with different degrees of speed. The document D2 describes the conveyance of paper with two different speeds by controlling the speed of the motor; it does not show two kinematic linkages, both associated with a single motor for producing high speed sheet movements and, via a linkage with a different transmission ratio, high resolution sheet movements.

*

The paper feeding device according to claim 22 differs from that disclosed in the document D1 in that it comprises:

- a clutch for operatively connecting the picking mechanism with the paper feeding motor,
- linkages for moving the sheet to be printed with different degrees of resolution and
- a control group servo dependent on the carriage for commanding said clutch and said linkages in different positions of the carriage, outside the printing area.

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The problem to be solved by the invention according to claim 22 may be regarded as providing a paper feeding device for a dot photographic printer which feeding operation is controlled by using the carriage for the printhead.

The solution to this problem proposed in claim 22 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The document D1 discloses the movement of the sheets by activating different rollers (feeding rollers, discharge rollers). Different degrees of resolution and a control group servo dependent on the (printhead) carriage are not disclosed and no hint is given for the solution.

The document D2 discloses the movement of the sheets with different degrees of speed, created by controlling the motor; the inventive constructional details with linkages and a control group that is servo dependent on a carriage are not shown.

NEW CLAIMS

1. Paper feeding device (33) for dot printers, for instance for a compact, ink jet photographic printer (21), comprising :

a paper feeding motor (83), and

5 a changeover mechanism (149) arranged downstream of said motor (83) and suitable for actuation in response to predetermined operating conditions of the printer to move a sheet to be printed (26) at high speed in a preparation stage and at high resolution in association with printing,

said paper feeding device (33) being provided for movement of the sheet
10 (26) in a given direction of printing (FW), and being characterized in that the preparation stage includes in sequence sub-stages of feeding and retracting,

wherein the feeding sub-stage is associated with picking of the sheet from a pack with movement of the sheet (26) in a direction consistent with the direction of printing (FW) and the retracting sub-stage includes the movement of the sheet (26)
15 in the direction (BW) opposite the direction of printing (FW), along an alternative path to the picking path.

2. Device according to claim 1 characterized in that the preparation stage includes a positioning sub-stage after the retracting sub-stage with movement of the sheet (26) consistent with the direction of printing (FW).

20 3. Device according to claims 1 or 2, characterized in that said changeover mechanism (149) is provided for moving a sheet (26) at high speed in an expulsion stage, subsequent to its being printed, with movement of the sheet (26) consistent with the direction of printing (FW).

4. Paper feeding device (33) for dot printers, for instance for a compact, ink jet
25 photographic printer (21), comprising :

a paper feeding motor (83), and

a changeover mechanism (149) arranged downstream of said motor (83) and suitable for actuation in response to predetermined operating conditions of the printer to move a sheet to be printed (26) at high speed in a preparation stage and at high resolution in association with printing,

said paper feeding device (33) being characterized in that it comprises an actuating member (153) positioning of which is servo dependent on the direction of rotation (CW, CCW) of the paper feeding motor (83) for switching the changeover mechanism (151) between high speed and high resolution.

5. Device according to claim 4, characterized in that said actuating member (154) is fulcrum-mounted on the axis of the feeding motor (83) and is suitable for assuming angular positions associated with a first configuration (Fig. 4) for movement of the sheet at high speed and with a second configuration (Fig. 7) for movement of the sheet at high resolution.

6. Device according to claim 4 or 5, characterized in that it comprises a blocking group (127, 174, 172) for blocking the position of the actuating member (153) and overriding servo dependency on the above-mentioned direction of rotation (CW, CCW) and a control group (127, 128, 134, 178) liable for actuation to de-activate said blocking group.

7. Device according to claim 6 in which the printer comprises a carriage (31) for a printhead movable along a printing area (41), said feeding device (33) being characterized in that the control group (127, 128, 134, 178) is servo dependent on the carriage (31) for re-establishing servo control of the actuating member (153) in a working position of the carriage (31), external to the printing area (41).

8. Device according to claim 7, characterized in that it is applied on an ink jet

printer comprising a cleaning station (84) in an end-of-stroke-position, said working position being adjacent to said cleaning station.

9. Device according to claim 6 or 7 or 8, **characterized in that** said blocking group (127, 174, 172) comprises storing elements (181) for storing a setting condition of said blocking group.

10. Device according to claim 1 and one of the claims from 6 to 9, **characterized in that** the retracting sub-stage is started by the feeding sub-stage with activation of the blocking group (127, 174, 172) and inversion (CW/CCW) of the direction of motion of the paper feeding motor (83).

10 11. Device according to claim 10, **characterized in that** it comprises a passage sensor (60) switchable by a sheet (26) in an end-of-picking position and in which the retracting sub-stage starts with a switching of the passage sensor (60) and terminates with another switching of the sensor upon the sheet passing through the end-of-picking position.

15 12. Device according to claim 2 and one of the claims from 6 to 11, **characterized in that** the positioning sub-stage is started by the retracting sub-stage with inversion (CCW/CW) of the direction of motion of the paper feeding motor (83) in association with an activated condition of the blocking group (127, 174, 172).

20 13. Device according to claim 12, **characterized in that** it comprises a reference sensor (61) switchable for a reference position of the sheet (26) with respect to the printing area (41) and in which said positioning sub-stage terminates with a commutation of the reference sensor (61) in the sheet reference position.

25 14. Device according to claim 2 and one of the claims from 6 to 13, **characterized in that** the printing step is started by the positioning sub-stage with

de-activation of the blocking group (127, 174, 172) and inversion (CW/CCW) of the direction of motion of the paper feeding motor (83).

15. Device according to claim 5 and one of the claims from 6 to 14, characterized in that said actuating member (154) is suitable for being driven in the direction of rotation of the feeding motor (83) for determining the condition of high speed or high resolution movement and in which said blocking group comprises a stopping member (174) for blocking said actuating member in the first configuration and a removing element (127, 178) that may be actuated render the above-mentioned stopping member inoperative (178).

16. Device according to claim 1 or 2 including a picking mechanism (122), said feeding device (33) being characterized by a clutch (124) that may be connected for picking with the paper feeding motor (83) in said feeding sub-stage.

17. Device according to claims 7 or 8 and 16, characterized in that said clutch (124) may be actuated by the carriage (31) in a maximum overtravel position and in which said working position corresponds to an intermediate overtravel position of the above-mentioned carriage (31).

18. Device according to any one of the previous claims, characterized in that it comprises a worm screw (167) and helical wheel (168) coupling that may be actuated by the above-mentioned changeover mechanism (149) for high resolution movement of the sheet to be printed (26).

19. Paper feeding device (33) for dot printers, for instance for an ink jet photographic printer (21), said feeding device (33) including a paper feeding motor (83) and being characterized in that it comprises :

a first kinematic linkage (152) associated with said feeding motor (83) for producing high speed sheet movements in a picking and print preparation stage,

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a second kinematic linkage (153) associated with said feeding motor (83) and having a transmission ratio different from that of said first kinematic linkage for producing high resolution sheet movements in association with printing, and

5 an actuating member (154) for putting the first kinematic linkage (152) or the second kinematic linkage (153) into operation,

wherein, for a given direction of rotation of said motor (CCW), the second kinematic linkage (153) is suitable for determining a direction of movement of the sheet (26) opposite to that of the first kinematic linkage (152).

20. Device according to claim 19, characterized in that said actuating member
10 (154) comprises a plate (156) supporting a pair of intermediate tooth wheels (159, 166) meshing with a pinion (151) of said motor and in which said plate is suitable for being driven by said pinion (151) in the direction of rotation of the feeding motor (83) for connecting in the rotation one or the other of the intermediate tooth wheels (159, 166) with the first kinematic linkage (152) or with the second kinematic
15 linkage (153) and for maintaining this connection.

21. Device according to claim 20, characterized in that it comprises a blocking group (127, 174, 172) that may be actuated to block said plate (156) in a predetermined configuration allowing operativity of the first kinematic linkage for two directions of rotation of the motor (CW, CCW).

20 22. Paper feeding device (33) for dot printers, for example for an ink jet, photographic printer (21) comprising a carriage (31) for a printhead movable along a printing area (41), said device (33) including a paper feeding motor (83) and a picking mechanism (122) for picking from a pack and feeding one by one the sheets to be printed (26) and being characterized in that it comprises a clutch
25 (124) for operatively connecting said picking mechanism (122) with the paper

feeding motor (83), linkages (152 153) for moving the sheet to be printed (26) with different degrees of resolution and a control group (127, 128, 134, 178) servo dependent on the carriage (31) for commanding said clutch and said linkages in different positions of the carriage (31), outside the printing area (41).

5 23. Paper feeding device (33) for dot printers, for example for a compact, ink jet, photographic printer (21), said feeding device including a paper feeding motor (83) and being characterized by a kinematic linkage (153) comprising a worm screw (167) that may be actuated by the above-mentioned paper feeding motor and a helical wheel (168) for moving a sheet (26) at high resolution in association
10 with printing.

24. Device according to claim 23, characterized in that it comprises a support (156) for said worm screw (167) and upon which rotates an intermediate tooth wheel (166) integral in rotation with said worm screw and meshing with a pinion (151) of said motor, and in which said support (156) is suitable for being driven by
15 said pinion (151) in a predetermined direction of rotation (CCW) of the motor (83) for bringing the worm screw (167) into engagement with the helical wheel (168) and for maintaining this engagement.

25. Device according to claim 24, characterized in that it comprises clutching means operating on the whole made up of the worm screw (167) and the
20 intermediate tooth wheel (166) having an anti-vibration function in the meshing between said worm screw (167) and said helical wheel (168).

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